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Carotid Artery and Internal Jugular  
Veins; Double Ligature of  
both Vessels; Recovery.*

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*presented by the author*

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ARTERIO-VEINUS ANEURISM OF THE COMMON CAROTID  
ARTERY AND INTERNAL JUGULAR VEINS; DOUBLE  
LIGATURE OF BOTH VESSELS; RECOVERY.<sup>1</sup>

By W. W. KEEN, M.D.,

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R. F., aged sixteen years, on November 24, 1890, was stabbed by another boy, with a pocket-knife, on the right side of the neck. There was instant and very profuse loss of blood, so that he fell to the ground before he could get to Dr. Deering's office, which was only about one hundred feet away. The doctor placed a compress over the wound, but on account of the boy's desperate condition did not tie the vessels. Pressure was applied from that time until I saw him; no other treatment had been used. He had frequent attacks of epistaxis after the accident.

He was kindly referred to me, March 10, 1891, by Dr. D. M. Crawford, of Mifflintown, Pa. I found him in the following condition: There was a scar one and one-eighth inches long at the site of the stab, at the internal border of the sterno-cleido-mastoid muscle, on a level with the lower border of the thyroid cartilage. The sterno-mastoid was markedly thinned, so that apparently there was only skin and superficial fascia between the arterio-venous aneurism which had formed, and my hand. With every pulsation the skin over an area about three inches vertically and two inches transversely showed a series of vibrations like a partly filled water-bag. The hand felt a thrill over a large area, from the middle line to the anterior border of the trapezius, and from the clavicle to within half an inch of the lobe of the ear. This thrill was very distinct, and was increased with each heart-beat. An aneurismal rasping bruit could be heard with the stethoscope, not only over the site of the tumor, but throughout the entire circumference of the neck, on the left side as well as on the right, over the whole of the head, all of the anterior portion of the chest, down the back as far as the lumbar region, in the right axilla, and also nearly down to the right elbow. The impression given an observer was that the tissues overlying the aneurism were thinning gradually, and before very long would probably burst.

An attempt had been made to cure the aneurism by the continued pressure of a bag of shot. His head was held in a fixed position, with the chin strongly rotated to the left, and the right ear bent markedly toward the right shoulder, with, of course, a similar flexion and rotation of the cervical vertebræ, which seemed almost to have become permanent. Whether this was a result of the shot-bag, as seemed likely, or of the wound itself, was a little uncertain. He had great discomfort, not only from the noise of the thrill and the pain in the wound, but also

<sup>1</sup> Read before the Philadelphia Academy of Surgery, April 4, 1892.



from the constrained position of the head. This was also a marked deformity, and attracted constant attention from strangers.

Dr. Howard F. Hansell kindly examined the eyes, and reported the fundus entirely normal.

*Operation, March 13, 1891.* An incision four inches long was made from the sterno-clavicular articulation, just above the clavicle. Another incision was carried from the same point along the internal border of the sterno-cleido-mastoid muscle, and gradually, as the need arose, was carried all the way up to a point a little above the angle of the jaw. (See figure.) The external jugular vein was ligated; it was of large size and pulsating. The sterno-cleido-mastoid, both the sternal and clavicular portions, was cut through and lifted with the flap of skin, and gradually and most carefully in this way the deeper structures of the entire neck were laid bare. A transverse vein just above the clavicle, possibly the transversalis colli, was distended and pulsating. It was accidentally nicked in cutting through the sterno-cleido, and a lateral ligature was applied. It was so large that at first it was thought it might be the subclavian. Later in the dissection, however, the subclavian was seen enormously distended at a deeper level. The jugular vein was found to be distended to an inch and a half in diameter, and to be closely adherent to the carotid artery. The artery was normal in size and appearance. After a very tedious and difficult dissection, especially at the site of the wound, the vein was isolated from the soft parts and from the pneumogastric, and after a similar difficult isolation of the carotid, separate ligatures of silk were thrown around each vessel at the lower part of the neck. The dissection was then continued upward until, at a point a little below the angle of the jaw, the vein suddenly narrowed to nearly its ordinary diameter. The vein at this point was then secured by a silk ligature. A very painstaking dissection had been required to separate the nerve from the vessels at this point. During this procedure a rent was unavoidably made in the vein. Its edges were quickly seized and held fast with three hemostatic forceps, which lay parallel to each other during the dissection, and were not removed until the ligature had been placed above them. The carotid was then secured just below its bifurcation. No phenomena occurred during the ligation of either vessel. As the sac was already opened by the accidental rent above described, and also still seemed to show slight pulsation, I deemed it wise to lay it widely open in order to determine whether any other vessels communicated with it which might cause a serious later hemorrhage. When opened, the wound in the carotid artery was seen to be a slit over half an inch long, readily admitting the tip of my forefinger. A small artery was bleeding near the opening, and was secured by a ligature. I attempted to remove the sac, but found its adhesions so firm and extensive that I thought it more prudent to leave it. At the close of the operation the wound was thoroughly washed out with a hot bichloride solution and then closed; but it had to be immediately reopened before dressing, as I found there was considerable bleeding from two vessels in the flap—one at the lower and one at the upper end—which required ligatures. The wound was then again closed and dressed with an ample sublimate dressing.

The entire operation, including the securing of the later bleeding vessels, took a little over two hours. The boy recovered very quickly and quietly from the ether, and felt very comfortable. There was almost no

shock, as the result either of the operation or of the ligation. His mental condition was perfectly clear.

*March 16 (3d day).* Yesterday afternoon he had a rather sharp attack of bleeding from the right nostril, and his mother now informs me that he has been especially subject to these attacks since the accident. This morning when the Resident disturbed the clot the bleeding commenced again, but was readily checked with a little alum solution applied with an atomizer. Yesterday (2d day) the drainage-tubes were removed, and to-day, on re-dressing the wound, I found it looking so well that I removed the alternate stitches. His temperature, which had a post-operation rise once up to  $101^{\circ}$ , is to-day normal; appetite good, and he slept eight hours last night. The right temporal artery is beating this morning, but in consequence of absence after the operation I am not able to say exactly when the pulsation first returned. I directed him to be kept as quiet as possible, so that until there is definite healing there shall be nothing to favor a secondary hemorrhage.



Arterio-venous aneurism of common carotid artery and jugular vein, showing the sterno-mastoid and the clavicular scars of the operation.

*December 22.* From the moment of the operation the wound progressed favorably, and, excepting that at one point at the lower end of the wound, a small sinus persisted for two or three weeks, nothing untoward occurred. There were several later slight attacks of epistaxis, but they were quickly checked by a spray of alum.

He was kept in bed until the eighteenth day, lest some accident should occur, especially to the jugular. This was so enormous that I hardly

dared trust it until then. After leaving his bed he was encouraged to attempt to correct the deformity in his neck, but his efforts were only partially successful. After leaving the hospital, however, he gradually straightened the neck and obtained full motions of the head in every direction. His health is entirely reëstablished in every way (March, 1892). The accompanying figure from a photograph shows his present condition and the scars of the operation. The scar of the wound is lost in that of the operation. On April 2, 1891, Dr. Hansell reported the eyes unchanged in any way as a result of the operation.

REMARKS.—I have been particularly interested in this case, not only because it is without exception the most difficult dissection of the neck I have ever had to do, but also because, just after the case was first referred to me, I read Dr. B. Farquhar Curtis's excellent paper in *THE JOURNAL* for February, 1891. In that paper Dr. Curtis expresses the view that cases involving the internal jugular should not be treated by operation.

In a private letter to me he states that his reasons are: First, that these aneurisms in the neck, especially those involving the internal jugular, as a rule cause very little disturbance, and that very few of them would warrant any serious operation. Secondly, they are surrounded by such important vessels that extirpation would be exceedingly dangerous to life, the dissection being in a region where the bloodless method cannot be employed. Thirdly, Stimson has shown (*THE AMERICAN JOURNAL OF THE MEDICAL SCIENCES*, April, 1884, p. 325) that for some unknown reason ligation of the carotid is more dangerous in these cases than in cases of ordinary aneurism.

Curtis adds, however, that these reasons are theoretical, and says: "Of course, with our new methods, we are rewriting the history of many operations, and theoretical reasons are always in danger of being overthrown by practical experience. Personally, I should desire very marked disability and discomfort in a patient before being willing to operate on these cases."

To a very large extent I share Dr. Curtis's opinion. But this case seemed to me to present sufficient disability and also sufficient danger to make even a perilous operation justifiable. The result certainly has proved the wisdom of this course; and the boy is entirely well from an aneurism which otherwise might have ruptured and caused speedy death, to say nothing of the deformity and the constant discomfort to which he was subjected. Moreover, two lives hung upon the result, for the boy who stabbed him was in jail for a number of months, and was only released after the definite cure of the patient.

In many cases of arterio-venous aneurism the artery is markedly altered. This was not the case here. The artery in every respect, so far as eye and touch could judge, was entirely normal; but the vein was distended to an enormous size, and, curiously enough, narrowed suddenly

at the upper end of the neck. Pressure had been applied continuously from the time of the accident until he was placed under my care. Not only had it done no good, but I am inclined to think it had done positive harm, except at first when it checked the hemorrhage; for to this cause must be attributed the rotation and lateral curvature of the neck—a source of great discomfort as well as a marked deformity.

I attempted, it will be seen, after double ligation of both vessels, to extirpate the sac, as has been done of late with such admirable success, as shown by Dr. Curtis. I abandoned the excision, inasmuch as the operation had been very long, and the attachment of the sac to the pneumogastric, and probably also to the sympathetic nerve, was so intimate that I was convinced I would do more harm than good by proceeding. I laid open the vein, however, in order to see whether there was any branch uniting the artery and vein between my ligatures, which were far apart. It was fortunate that I did so, for had I not, the vessel which I found still opening into the sac might have kept up trouble, and even made the operation futile.





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